POSTER SESSION

1114 Mapping and Catheter Ablation of Ventricular Tachycardia

Monday, March 31, 2003, Noon-2:00 p.m.
McCormick Place, Hall A
Presentation Hour: 1:00 p.m.-2:00 p.m.

1114-13 Timing of Right Ventricular Electrograms: New Criterion for Localizing the Site of Origin of Left Ventricular Tachycardia

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Background: Ventricular tachycardia (VT) with a right bundle branch block morphology and an anterior infarct (MI) have similar 12-lead ECGs from septal or lateral left ventricular (LV) sites of origin (SOO) and the ECG does not help to guide mapping. **Methods:** We evaluated 58 patients (pts) with unimorphic VT (13 with normal LV and 45 with prior MI) to determine if timing to an RV apical electrogram (QRS-RV) can identify septal versus lateral LV origin during LV pacemapping (PM) and VT. PM was delivered at the LV apical septum (Josephson site #2) and lateral apex. (Josephson site # 7 or # 9) LV anatomy and PM was guided by magnetic mapping (CARTO). Group 1 pts (MI) had anterior scar (n=16) and Group 2 pts had no anterior scar (n=29). Of 165 VTs, the SOO was documented for 114 using entrainment techniques and 21 of these VTs from the apical septum were compared to 26 VTs from the lateral apex.

Results: See Table.

Values are given as the mean ± standard deviation. All septal QRS-RV times are significantly shorter than the corresponding lateral QRS-RV time (P<0.001). **Conclusions:** The QRS-RV time identifies LV septal versus free wall SOO for LV PM and VT in pts with and without MI. Importantly, in pts with anterior MI, a QRS-RV time < 100 ms uniformly identifies septal and > 120 ms lateral SOO for both PM and VT. As the 12-lead ECG may not help to localize VT in pts with anterior MI these data are important for VT localization during VT ablation.

	Septal PM QRS-RV (ms)	Lateral PM QRS-RV (ms)
Group 1	59±16 (Range: 36-93)	187±24 (Range: 136-248)
Group 2	70±14 (Range: 32-118)	169±19 (Range: 132-203)
Normal LV	42±15 (Range: 16-50)	86±16 (Range: 64-107)
	Septal VT QRS-RV (ms)	Lateral VT QRS-RV (ms)
Group 1	50±13 (Range: 27-87)	178±21 (Range: 128-197)
Group 2	67±17 (Range: 31-114	157±20 (Range: 122-192)
Normal LV	33±12 (Range: 14-49)	71±16 (Range: 55-86)

1114-14 Coincident Right Ventricular Outflow Tract Tachycardia and Atrioventricular Nodal Reentry Tachycardia: More Than a Random Association?

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Background and purpose: To the best of our knowledge, the coexistence of idiopathic right ventricular outflow tract tachycardia (RVOT-VT) with atrioventricular nodal reentry tachycardia (AVNRT) has only been reported once before. This study was aimed to analyse a potential association between both types of tachycardia.

Methods. We studied the incidence of this clinical association in 30 consecutive patients (P) undergoing catheter ablation (ABL) of RVOT-VT at our institutions (VT group). This incidence was compared to that of the AVNRT in 250 consecutive P who underwent ABL of an accessory pathway (control group). In addition, we analysed the differences in clinical, electrocardiographic and electrophysiological characteristics between P with both types of tachycardia and P with only RVOT-VT. Results: Six P (20 %, 4 women, mean age 47 ± 12 years) presented clinical (3P) or induced (6P) common type AVNRT in addition to RVOT-VT. No patient, except one, had structural heart disease. VT presented with palpitations in all patients and syncope in 4, one of whom also had clinical AVNRT. VT was repetitive, nonsustained in 2 patients and sustained in 4. The mean VT cycle length was 357 ± 54 ms and the mean AVNRT cycle length was 337 ± 56 ms. In a patient, RVOT-VT and AVNRT occurred simultaneously. The incidence of AVNRT in the control group was only 2 % (5 P, clinical in 2 and induced, non clinical in 3; p< 0.001). Clinical characteristics were similar in both groups. Isoproterenol was used in 75 % of studies in VT group but only in 25 % in control group (p<001). P with both types of tachycardia presented a significantly higher incidence of syncope (67 % vs 23 %; p < 0.01) and sustained monomorphic VT (67 % vs 39 %; p < 0.01), a longer duration of symptoms (7.5 ± 3 vs 4 ± 3 years; p < 0.05) and a higher number of previous ineffective drugs (3 ± 2 vs 1 ± 1; p = 0.04) as compared with P with only RVOT-VT. In the three P with clinical AVNRT and RVOT-VT, ABL of both substrates was successfully performed.

Conclusion: our study supports the existence of an association between idiopathic RVOT tachycardia and AVNRT. A definitive explanation for this coexistence requires further investigation.

1114-15 Can an Epicardial Origin of Idiopathic Left Ventricular Tachycardia Be Predicted From the Surface Electrocardiogram?

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Background: Identification and catheter ablation (CA) of epicardial foci (EPF) in pts with idiopathic left ventricular tachycardia (ILVT) remains problematic. Recognition of EPF based on 12 lead ECG characteristics would facilitate selection of mapping and CA strategies, and minimize prolonged attempts at endocardially-based CA. Greater QRS duration has been proposed as a predictor of EPF. However, the utility of specific ECG features has not been confirmed.

Methods: ECGs were recorded during ILVT in 35 pts in whom the site of origin (SOO) was confirmed by successful ablation. ECGs were examined by 3 independent reviewers blinded to the SOO. ECG characteristics, including QRS duration, voltage in each lead, frontal plane axis, precordial transition, QRS notching, and QRS onset (small r or q wave, slurred upstroke) were scored by each reviewer and differences resolved by consensus. Endocardial foci were identified in 28 pts, including posterior fasicular reentry (PFR) ablated from the mid or apical inferior septum (n=18), and focal VT arising from the basal LV or LV outflow tract (n=10). EPF were identified in 7 pts (3 anterobasal, 2 basal lateral, 1 apical, and 1 posterobasal). For all EPF, epicardial activation preceded earliest endocardial activation by ≥10ms, pacing resulted in an exact QRS match, and previous endocardial CA was unsuccessful.

Results: No single ECG feature discriminated epicardial from endocardial foci. In pts with endocardial SOO, PFR was associated with significantly shorter QRS duration (140±18 ms, range 100-180 ms) than focal VT (166±17 ms, range 145-200 ms, p<0.01), suggesting earlier engagement of the His-Purkinje system. Overall, QRS duration did not significantly differ between epicardial and endocardial SOO (160±28 ms [range 135-230 ms] vs 149±21ms [range 100-200 ms], p=0.36). EPF were not found in pts with right bundle superior axis ILVT and QRS duration ≤140, but this combination was present in only 11/35 pts (31%).

Conclusions: In pts with ILVT, an epicardial SOO cannot be reliably predicted from the 12-lead ECG. Epicardial mapping should be considered early in the course of evaluation, particularly in pts not responding to initial attempts at endocardial CA.

1114-16 Advanced Fast Electro-Anatomical Mapping to Guide Radiofrequency Catheter Ablation of Ventricular Tachycardia

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Background: Accurate localization of target sites is required for successful ablation of ventricular tachycardias (VT). As this is time consuming, fast mapping techniques may be advantageous. This study therefore assessed the clinical feasibility of a new, rapid electro-anatomical mapping technique (QwikMapping) for guiding ablation of VT.

Methods: Pts (n=15, 53±9 yrs) with drug refractory VT underwent ablation guided by the CARTO™ XP QwikMap technique. A 7 Fr catheter, containing a 4 mm tip/ring electrode, 24 shaft electrodes and 2 tri-axial location sensors was used for mapping/ablation. During acquisition of contact points (tip points), cavitary potentials (Qwikpoints) were recorded by all shaft electrodes. Cavitary potentials were also collected by the tip and shaft electrodes during navigation of the catheter (trace points). The electrical and anatomical information in this way acquired was integrated in a Qwik-map reconstruction surrounding all points. Qwikmaps were used to identify sites of earliest activation (SEA). High density mapping and electrophysiological testing in this area was then used for selection of target sites for ablation. Successful ablation was defined as termination during ablation and non-inducibility of VT after ablation.

Results: Prior to high density mapping, SEA in right sided (n=4) and left sided (n=11) VT were identified using respectively 23±7 tip points, corresponding with 91±6 Qwik points and 113±14 trace points.Within the SEA,9±4 additional tip points were required for selection of target sites. Successful ablation was achieved in all pts with right-sided VT and in 13 pts with left sided VT.Complications were not observed.

Conclusion: Ablation of VT guided by QwikMapping has a high procedural success rate. Simultaneous acquisition of both endocardial and intracavitary potentials facilitates identification of target sites for ablation which is advantageous in pts with hemodynamically intolerable VT's.

1114-17 Recording Range of Noncontact Mapping

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A non-contact mapping system (Ensite 3000, ESI) has been developed to reconstruct endocardial potentials for single beat mapping of cardiac arrhythmias. The purpose of this study was to investigate the ability of the non-contact mapping to identify small, discrete localized endocardial potentials as a function of amplitude of the potentials and distance from the non-contact probe. Recording of left ventricular Purkinje (P) potentials were used for the evaluation.

Methods and Results: In 7 closed chest dogs (28-45kg), a 9F non-contact multi-electrode balloon array (MEA, ESI) catheter and a 7F contact electroanatomical mapping catheter (CARTO, Biosense Webster) were inserted into the left ventricle (LV). The contact catheter was maneuvered to record P-potentials at 41 LV sites in the 7 dogs. The P-potential was reconstructed (virtual electrogram) by the MEA at 37 of 41 sites. The 37 sites with successful reconstruction were located 0-2.4 (median 0.9) cm from the surface of the balloon and had an amplitude of 0.07-0.77 (median 0.31) mV measured by the